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## Analyzing the determinants of terrorist attacks and their market reactions

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## ABSTRACT

The aim of this paper is to explore the determinants of terrorist unexpected events and if these events can affect economic markets. Based on the existing literature and the methodologies already been used, our purpose is to draw some attention to specific events, which may create losses to investors or even to countries. Specifically, after a thoughtful consideration of the existing studies, we discuss a number of empirical findings concerning the main determinants of terrorism. Based on previous research there is a belief that religions and especially fanatics is a very significant determinant of an attack. We show that the more democratic and developed countries are inclined to decrease the spread on the returns. Relying on these empirical findings, we discuss the implied policy implications and the necessary further research.

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## 1. Introduction

Terrorism is not a new phenomenon (Carter et al., 1998). Economic analysis and consequences of terrorism have attracted significant and continuous research interest. Apart from human life losses, the victims of terrorist attacks suffer from fear of brutal violence and immense number of injuries, which may lead to a number of associated indirect costs. These costs are not easily countable and refer to immense amount of resources necessary to protect against terrorism or to the instant harms and losses of property and capital caused by a terrorist attack. Terrorist actions may negatively affect many economic and social activities like among others flows of FDI, tourism, and economic uncertainty and stock markets with reductions in firms' expected profits.

As it is well known and accepted, rational investors are by their nature risk averters. This means that they prefer safe investments that will not put their capital into risk. On the other hand, what characterizes markets is uncertainty. Drakos (2010) investigated whether there is a negative significant return on daily base after a terrorist attack in 22 different countries proving that the event day's return is lower than the expected. That comes in line with Essaddam and Karagianis (2014) who investigated the volatility of the stock prices of the American firms after an attack, with Nikkinen and Vähämaa (2010) also pointing out a significant downward shift. Conversely, Graham and Ramiah (2012) indicated that there is no effect on the market when an attack occurs. The reasoning that high risks lead to high returns and to high profits is what

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predominates in markets,<sup>1</sup> either capital or stock. Therefore, hedging is the tool that comes to fill the gap between risk adverse investors and markets' uncertainty. In that way, investors can secure themselves for changes in interest rates, exchange rates or even share price changes by using future or option products.

However, the question is how they will secure their investments against unexpected events. The main issue in that case is that no one can predict the exact time or place or whether an unexpected event is going to occur or not. Many people assume that some events like weather outbreaks are predictable while there are some cases such as terrorist attacks that are not probably predictable. Among others, [Kollias et al. \(2011a\)](#) using event study and GARCH models explore the influence of the terrorist attacks in Madrid (11th March 2004) and in London (7th July 2005) and the effect of these attacks on equity sectors. They find significant negative abnormal returns only in Spain but with a much quicker market rebound in London compared to the Spanish markets where attackers were not suicide bombers. Similarly, [Kollias et al. \(2011b\)](#) considered whether market reaction (depending on either targets' type or attacks' perpetrators) to terrorism has been altered diachronically and if market size and its maturity establish reactions. They consider the London and Athens stock exchange capitalization markets and using an event study methodology and conditional volatility models they find empirical evidence that size and maturity together with specific attributes of terrorist incidents are probable determinants of markets' reactions.

In this paper, we focus on whether there is a linkage between terrorist attacks and specific determinants such as geographic position, religion, and government system and of course the period. Specifically, we consider the theoretical and empirical framework of this specific issue. Following the occurrence of these events, market reactions are expected to be negative due to the unforeseen happenings causing opposite effects on firms and economies.

The outline of the paper is as follows. Section 2 presents previous research studies examining the purposes of these papers, the applied methodologies and their main empirical findings. Section 3 presents the data used in our research effort together with their graphical and statistical presentations. Section 4 presents an event study and discusses the main findings on this analysis. Finally, Section 5 concludes the paper and proposes further research steps.

## 2. Literature review

### 2.1. The purpose

[Tavares \(2004\)](#), apart from the examination of stock returns, investigates the main determinants causing terrorism. Based on [Major \(2002\)](#), the risk of terrorism is higher in comparison to other catastrophes, because is driven by both intelligence and intent. Intelligence is a factor excluded from natural unexpected catastrophes and intent is a factor excluded from industrial disasters. This makes terrorist attacks more dangerous compared to other catastrophes ([Major, 2002](#)). However, that situation may become even worse when the main weapon of terrorism is any kind of biological agent. A terrorist may use a pathogen due to the fact that this element may not be easily detected as a potential threat. As a consequence, the pathogen will have the adequate time to spread so as to be presented as a natural disease and not as a bioterrorist attack ([Dembek, 2005](#)). Since no one can accurately answer the question whether each disease was caused naturally or was a bioterrorist attack, the available data for bioterrorism is in fact narrow.

[Chesney et al. \(2011\)](#) examined the terrorist attacks especially on financial markets and suggested that the non-parametric methods are more appropriate for the investors or portfolio managers in order to take into consideration the risk of a terrorist attack. [Procasky and Ujah \(2016\)](#) come to an agreement with [Chesney et al. \(2011\)](#) by proposing a model for predictions that can help investors to diversify their portfolios. From another perspective, [Frey et al. \(2004\)](#) investigated the terrorist attacks and the different activities that have influenced not only the market but also the associated economic impact. Their analysis provides evidence that a terrorist attack may have an outcome to eight different activities, such as tourism, investments as well as foreign direct investments, savings and consumption, foreign trade, urban economy, national income and growth and of course stock markets. This analysis provides an integrated view of the outcomes that a terrorist attack may have.

Considering the purpose per region, the terrorist attacks on the USA embassies in Kenya and Tanzania inspired ([Carter et al., 1998](#)) in their research. Although USA supports the belief that they are prepared for any terrorist attack, because terrorism for them is a serious matter, [Carter et al. \(1998\)](#) proved that USA is not prepared enough to face such events especially when the events have as a target the government, services or embassies.

On these lines, the terrorist attack that inspired a great number of researchers is the 11th of September 2001, which shocked the whole world. [Charles and Darné \(2006\)](#) examined whether this attack had a temporary or a more permanent consequence due to the huge economic result caused. Based on their findings, the international stock markets did experience both permanent and temporary shocks and figured out that if these events were taken into consideration financial risk modeling could be improved by eliminating volatility of the stock market prices. On the other hand, [Bhattarai et al. \(2005\)](#) investigated the results of the same terrorist attack on September 11, but not in the USA. The region of their interest was Nepal. The main reason was the fact that since 1951 there was a great tourist increase in Nepal mainly from USA which dramatically decrease exactly after the terrorist attack of 11th of September 2001.

<sup>1</sup> *Capital market*: Primary or secondary financial market with long term debt or equity (more than a year). *Stock market*: also known as equity or share market. Buyers and Sellers of securities like shares are the participants of stock market.

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